

## APPENDIX

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**Table A-1**

Factors for the conversion of U.S. Customary Units to the International System (SI) of Units<sup>a</sup>

Multiply the U.S. customary unit		By	To obtain the corresponding SI unit	
Name	Abbreviation		Name	Symbol
acre	ac	40476.8564	square meter	m <sup>2</sup>
acre	ac	0.4047	hectare	ha
atmosphere	atm	1.0133 x 10 <sup>5</sup>	pascals	Pa (N/m <sup>2</sup> )
British thermal unit	Btu	1.0551	kilojoule	kJ
British thermal unit	Btu	0.2931	kilowatt per hour	kW•h
British thermal units per cubic foot	Btu/ft <sup>3</sup>	37.259	kilojoules per cubic meter	kJ/m <sup>3</sup>
British thermal units per hour per square foot	Btu/h•ft	23.158	joules per second per square meter	J/s•m <sup>2</sup>
British thermal units per square foot per hour	Btu/ft <sup>2</sup> •h	3.1525	kilowatt per meter square per second	kW/m <sup>2</sup> •s
British thermal units per kilowatt-hour	Btu/kWh	1.0551	kilojoules per kilowatt-hour	kJ/kWh
British thermal units per pound	Btu/lb	2.326	kilojoules per kilogram	kJ/kg
British thermal units per pound mass per degree fahrenheit	Btu/lb m•°F	4.187	joules per kilogram per kelvin	J/kg•K
British thermal units per ton	Btu/ton	1.16 x 10 <sup>-3</sup>	kilojoules per kilogram	kJ/kg
degree Celsius	°C	plus 273	Kelvin	K
calorie	C	4.187	joule	J (W•s)
cubic foot	ft <sup>3</sup>	0.0283	cubic meter	m <sup>3</sup>
cubic foot	ft <sup>3</sup>	28.3168	liter	L
cubic feet per minute	ft <sup>3</sup> /min	4.7190 x 10 <sup>-4</sup>	cubic meters per second	m <sup>3</sup> /s
cubic feet per minute	ft <sup>3</sup> /min	0.4719	liters per second	L/s
cubic feet per second	ft <sup>3</sup> /s	2.8317 x 10 <sup>-4</sup>	cubic meters per second	m <sup>3</sup> /s
cubic yard	yd <sup>3</sup>	0.7646	cubic meter	m <sup>3</sup>
day	d	86.4000	kilosecond	ks
degree Fahrenheit	°F	0.555(°F - 32)	degree Celsius	°C
foot	ft	0.3048	meter	m
feet per minute	ft/min	5.0800 x 10 <sup>-3</sup>	meters per second	m/s
feet per second	ft/s	0.3048	meters per second	m/s
feet of water	ft H <sub>2</sub> O	2.989 x 10 <sup>-2</sup>	pascal	Pa (N/m <sup>2</sup> )
gallon	gal	3.7854 x 10 <sup>-3</sup>	cubic meter	m <sup>3</sup>
gallon	gal	3.7854	liter	L
gallons per minute	gal/min	6.3090 x 10 <sup>-2</sup>	liters per second	L/s

Multiply the U.S. customary unit		By	To obtain the corresponding SI unit	
Name	Abbreviation		Name	Symbol
grain	gr	0.0648	gram	g
horsepower	hp	0.7457	kilowatt	kW
horsepower-hour	hp-h	2.6845	megajoule	MJ
inch	in	2.5400	centimeter	cm
inch	in	$2.5400 \times 10^{-2}$	meter	m
Inches of mercury	in Hg	3.367	pascal	Pa (N/m <sup>2</sup> )
kilowatt-hour	kWh	3.600	megajoule	MJ
pound force	lb <sub>f</sub>	4.448	newton	N
pound mass	lb <sub>m</sub>	0.4536	kilogram	kg
pound mass per hour	lb <sub>m</sub> /h	0.4536	kilogram per second	kg/s
pounds per capita per day	lb/capita•d	0.4536	kilograms per capita per day	kg/capita•d
Pounds per cubic foot	lb/ft <sup>3</sup>	16.0181	kilograms per cubic meter	kg/m <sup>3</sup>
pounds per cubic yard	lb/yd <sup>3</sup>	0.5933	kilograms per cubic meter	kg/m <sup>3</sup>
pounds per square foot	lb/ft <sup>2</sup>	47.8803	newtons per square meter	N/m <sup>2</sup>
pounds per square inch	lb/in <sup>2</sup>	6.8948	kilonewtons per square meter	kN/m <sup>2</sup>
million gallons per day	Mgal/d	$4.3813 \times 10^{-2}$	cubic meters per second	m <sup>3</sup> /s
miles	mi	1.6093	kilometer	km
miles per hour	mi/h	1.6093	kilometers per hour	km/h
miles per hour	mi/h	0.4470	meters per second	m/s
miles per gallon	mpg	0.425	kilometers per liter	km/L
ounce	oz	28.3495	gram	g
square foot	ft <sup>2</sup>	$9.2903 \times 10^{-2}$	square meter	m <sup>2</sup>
square inch	in <sup>2</sup>	$6.452 \times 10^{-4}$		
square mile	mi <sup>2</sup>	2.5900	square kilometer	km <sup>2</sup>
square yard	yd <sup>2</sup>	0.8361	square meter	m <sup>2</sup>
ton (2000 pounds mass)	ton (2000 lb <sub>m</sub> )	907.2	kilogram	kg
watt-hour	Wh	3.6000	kilojoule	kJ
yard	yd	0.9144	meter	m

a Adapted from Crites and Tchobanoglous (1998).

**Table A-2**Conversion factors for commonly used wastewater treatment plant design parameters<sup>a</sup>

To convert multiply in direction shown by arrows			
U.S. units	→	←	SI units
Btu	1.0551	0.9478	kJ
Btu/lb	2.3241	0.4303	kJ/kg
Btu/ft <sup>2</sup> •°F•h	5.6735	0.1763	W/m <sup>2</sup> •°C
bu/ac•yr	2.4711	0.4047	bu/ha•yr
ft/h	0.3048	3.2808	m/h
ft/min	18.2880	0.0547	m/h
ft <sup>3</sup> /capita	0.0283	35.3147	m <sup>3</sup> /capita
ft <sup>3</sup> /gal	7.4805	0.1337	m <sup>3</sup> /m <sup>3</sup>
ft <sup>3</sup> /ft•min	0.0929	10.7639	m <sup>3</sup> /m•min
ft <sup>3</sup> /lb	0.0624	16.0185	m <sup>3</sup> /kg
ft <sup>3</sup> /Mgal	7.04805 × 10 <sup>-3</sup>	133.6805	m <sup>3</sup> /10 <sup>3</sup> m <sup>3</sup>
ft <sup>2</sup> /Mgal•d	407.4611	0.0025	m <sup>2</sup> /10 <sup>3</sup> m <sup>3</sup> •d
ft <sup>3</sup> /ft <sup>2</sup> •h	0.3048	3.2808	m <sup>3</sup> /m <sup>2</sup> •h
ft <sup>3</sup> /10 <sup>3</sup> gal•min	7.04805 × 10 <sup>-3</sup>	133.6805	m <sup>3</sup> /m <sup>3</sup> •min
ft <sup>3</sup> /min	1.6990	0.5886	m <sup>3</sup> /h
ft <sup>3</sup> /10 <sup>3</sup> ft <sup>3</sup> •min	0.001	1,000.0	m <sup>3</sup> /m <sup>3</sup> •min
gal	3.7854	0.2642	L
gal/ac•d	0.0094	106.9064	m <sup>3</sup> /ha•d
gal/ft•d	0.0124	80.5196	m <sup>3</sup> /m•d
gal/ft <sup>2</sup> •d	0.0407	24.5424	m <sup>3</sup> /m <sup>2</sup> •d
gal/ft <sup>2</sup> •d	0.0017	589.0173	m <sup>3</sup> /m <sup>2</sup> •h
gal/ft <sup>2</sup> •d	0.0283	35.3420	L/m <sup>2</sup> •min
gal/ft <sup>2</sup> •d	40.7458	2.4542 × 10 <sup>-2</sup>	L/m <sup>2</sup> •d
gal/ft <sup>2</sup> •min	2.4448	0.4090	m/h
gal/ft <sup>2</sup> •min	40.7458	0.0245	L/m <sup>2</sup> •min
gal/ft <sup>2</sup> •min	58.6740	0.0170	m <sup>3</sup> /m <sup>2</sup> •d
hp/10 <sup>3</sup> gal	0.197	5.0763	kW/m <sup>3</sup>
hp/10 <sup>3</sup> ft <sup>3</sup>	26.3342	0.0380	kW/10 <sup>3</sup> m <sup>3</sup>
in	25.4	3.9370 × 10 <sup>-2</sup>	mm
in Hg (60 °F)	3.3768	0.2961	kPa Hg (60 °F)
Mgal/ac•d	0.9354	1.0691	m <sup>3</sup> /m <sup>2</sup> •d
lb/ac	1.1209	0.8922	kg/ha
lb	0.4536	2.2046	kg
lb/hp•h	0.6083	1.6440	kg/kW•h
lb/Mgal	0.1198	8.3454	g/m <sup>3</sup>

To convert multiply in direction shown by arrows			
U.S. units	→	←	SI units
lb/Mgal	$1.1983 \times 10^{-4}$	8345.4	kg/m <sup>3</sup>
lb/ft <sup>2</sup>	4.8824	0.2048	kg/m <sup>2</sup>
lbf/in <sup>2</sup> (gage)	6.8948	0.1450	kPa (gage)
lb/ft <sup>3</sup> •h	16.0185	0.0624	kg/m <sup>3</sup> •h
lb/10 <sup>3</sup> ft <sup>3</sup> •d	0.0160	62.4280	kg/m <sup>3</sup> •d
ton/ac	2.2417	0.4461	Mg/ha
yd <sup>3</sup>	0.7646	1.3079	m <sup>3</sup>

<sup>a</sup> Adapted from Crites and Tchobanoglous (1998).

## References

Crites, R., and G. Tchobanoglous (1998) *Small and Decentralized Wastewater Management Systems*, WCB/McGraw-Hill, New York.